F019 - Wastewater Treatment Sludge from the Chemical Conversion Coating of Aluminum

We are announcing the availability of information we have acquired as we consider issuance of a proposed rule to amend the hazardous waste listing under the Resource Conservation and Recovery Act (RCRA) for wastes from the chemical conversion coating of aluminum, Hazardous Waste No. F019. In response to a March 2000 letter from the Aluminum Association and the Alliance of Automobile Manufacturers, the Agency is considering issuance of a proposed rule that would amend the F019 listing such that if the concentration of certain constituents of concern in wastewater treatment sludges from zinc phosphating processes in automotive assembly plants in the motor vehicle manufacturing industry fall below certain levels ("listing levels"), the waste would be excluded from the F019 listing description. We are making available for public review the waste sampling constituent data that we have collected and the methodology the Agency is considering for use in such a proposed rule. OSW welcomes any comment on the data and methodology, as we consider the data's viability to support a proposed rulemaking. We will review and consider any comments as we determine whether to move forward with a proposed rulemaking.

Background:

Defining Hazardous Waste

EPA's regulations establish two ways of identifying wastes as hazardous under RCRA. A waste may be considered hazardous if it exhibits certain hazardous properties ("characteristics") or if it is included on a specific list of wastes EPA has determined are hazardous ("listing" a waste as hazardous). EPA's regulations in the Code of Federal Regulations (40 CFR) define four hazardous waste characteristic properties: ignitability, corrosivity, reactivity, or toxicity (see 40 CFR 261.21-261.24). Generators must determine whether or not a waste exhibits any of these characteristics by testing the waste, or by using knowledge of the process that produced the waste (see §262.11(c)).

EPA may also conduct a more specific assessment of a waste or category of wastes and "list" them if they meet criteria set out in 40 CFR 261.11. As described in §261.11, we may list a waste as hazardous if it: exhibits a characteristic as noted above (§261.11(a)(1)), is acutely hazardous (§261.11(a)(2)), or is capable of posing a substantial present or potential hazard to human health or the environment when improperly managed due to the presence of toxic constituents (§261.11(a)(3)).

Under the third criterion, at §261.11(a)(3), we may decide to list a waste as hazardous if it contains hazardous constituents identified in Part 261, Appendix VIII, and if, after considering the factors noted in this section of the regulations, we conclude that the waste is capable of posing a substantial present or potential hazard. We place a chemical on the list of hazardous constituents on Appendix VIII only if scientific studies have shown a chemical has toxic effects on humans or other life forms. When listing a waste, we also add the hazardous constituents that serve as the basis for listing the waste to 40 CFR Part 261, Appendix VII.

If a waste exhibits a hazardous characteristic or is listed as a hazardous waste, it is subject to federal requirements under RCRA. These regulations affect persons who generate, transport, treat, store or dispose of such waste. Facilities that must meet hazardous waste management requirements, including the need to obtain permits to operate, commonly are referred to as "Subtitle C" facilities. Subtitle C is Congress' original statutory designation for that part of RCRA that directs EPA to issue regulations for hazardous wastes as may be necessary to protect human health or the environment. EPA standards and procedural regulations implementing Subtitle C are found generally at 40 CFR Parts 260 through 273.

F019 Wastes

The regulations at §261.31 through §261.33[1] contain the various hazardous wastes the Agency has listed as hazardous. Section 261.31 lists wastes generated from non-specific sources, known as "F-wastes," and contains wastes that are usually generated by various industries or types of facilities. This includes one of the F-code listings:

> F019 —Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process.

EPA promulgated the F019 listing as an outgrowth of the listing of wastewater treatment sludge from electroplating operations (F006). In response to comments on the proposed listing, EPA separated wastewater treatment sludge from chemical conversion coating of aluminum from the F006 listing and listed this waste separately as F019 (November 12, 1980; 45 FR 74884). The chemical constituents that served as the bases of the F019 listing were complexed cyanides and hexavalent chromium (see Appendix VII of 40 CFR Part 261).

EPA amended the F019 listing on February 14, 1990 (55 FR 5340) to exclude wastewater treatment sludges from the zirconium phosphating process, when phosphating is an exclusive process in the aluminum can washing process. EPA concluded that these sludges did not contain significant concentrations of Appendix VIII hazardous constituents.[2]

F019 and the Motor Vehicle Manufacturing Industry

F019 wastewater treatment sludges are generated from the treatment of the rinses and overflows

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[1] Section 261.32 lists hazardous wastes generated from specific industry sources, known as "K-wastes." Section 261.33 contains lists of commercial chemical products and other materials, known as "P-wastes"or "U-wastes," that become hazardous wastes when they are discarded or intended to be discarded.

[2] While hydrofluoric acid is present in low concentrations in can washing wastewater, it is readily treated to nonhazardous forms.

from the chemical conversion coating process in different types of industrial manufacturing operations. These rinses and overflows are usually piped and treated onsite within the facility's wastewater treatment system. In general, chemical conversion coating processes involve the application of a coating (e.g., by spray or dip tank) to a previously deposited metal or a base metal (e.g., iron, steel, zinc, aluminum) to increase corrosion protection and to prepare the surface for additional coatings, or the formulation of a special surface appearance. Most conversion coating operations include chromating, phosphating, metal coloring and/or immersion plating.

On March 3, 2000 in a letter to Ms. Elizabeth A. Cotsworth, Director, Office of Solid Waste, U.S. Environmental Protection Agency, J. Stephen Larkin, President, the Aluminum Association and Josephine S. Cooper, President, the Alliance of Automobile Manufacturers submitted information to the Agency describing the barriers presented by RCRA to aluminum use in automobile manufacturing. [3] According to information supplied to EPA in the March 3, 2000 letter, motor vehicle manufacturers typically use a zinc phosphating conversion process industry-wide, and the zinc phosphating process is essentially identical in all US automobile assembly plants. Phosphate conversion coatings produce a protective layer of insoluble crystalline phosphate on the surface of a metal, and may be applied to cast iron, tin, zinc, cadmium and aluminum, but generally not to more complex alloys except for low-alloy steel. Phosphate coatings are used to provide an adhesion-enhancing base for paints and other inorganic coatings, to condition the surfaces for cold forming operations by providing a base for drawing compounds and lubricants, and to impart a corrosion resistance to the metal surface by the coating itself or by providing a suitable base for rust-preventive oils or waxes. Phosphate conversion coatings are formed by immersion of metals in a dilute solution of phosphoric acid plus other reagents (e.g., sodium nitrite, hydrofluoric acid, fluorotitanic acid, nitric acid, potassium hydroxide, calcium).

Around 1973, the North American motor vehicle manufacturing industry began incorporating aluminum into vehicle parts and bodies, as a substitute for iron and steel. This substitution resulted in production of lighter-weight vehicles capable of increased gas mileage. (See March 3, 2000 letter.) However, when aluminum is incorporated into the body of a vehicle, the chemical conversion coating step in the vehicle manufacturing (assembly) process results in the generation of F019 hazardous waste, according to the current F019 listing description. On the other hand, wastewater treatment sludges generated from the conversion coating of vehicle bodies made of steel without aluminum are not F019 hazardous wastes. Thus, according to the March 3, 2000 letter, the existing F019 hazardous waste listing provides a barrier for using aluminum in motor vehicle manufacturing.

Six motor vehicle manufacturers submitted "delisting" petitions to EPA regional offices (regions 4 and 5) seeking an exclusion from the F019 listing for wastes from zinc phosphating conversion

[3] The March 3, 2000 letter and the enclosures are available. See Support Materials.

coating wastewater treatment at 17 automotive and light truck assembly plants.[4] The regulations governing the "delisting" process are set out at 40 CFR 260.20 and 260.22. These regulations set out a procedure and standards by which persons may demonstrate that a specific waste from a particular generating facility should not be regulated as a listed hazardous waste under Subtitle C of RCRA. Under these regulations, any person may petition the EPA to remove its wastes from regulation as a listed hazardous waste under Subtitle C by excluding it from the lists of hazardous wastes contained in Part 261 Subpart D. As noted below, the motor vehicle manufacturing industry has been granted 12 petitions during 1997 to 2004, to have their F019 wastes from certain facilities excluded from RCRA regulation as a listed hazardous waste.

In the follow-up to these prior plant-by-plant F019 delistings, the Aluminum Association and the Alliance of Automobile Manufacturers jointly stated in their March 3, 2000 letter that EPA should publish an interpretive rule (regulatory clarification) to remove the barriers to aluminum use in automobile manufacturing.

In response to that letter, we are considering issuance of a proposed rule amending the F019 listing to exclude from the listing description waste from zinc phosphating processes in automotive assembly plants in the motor vehicle manufacturing industry in which concentrations of key constituents of concern for zinc phosphating fall below certain concentration levels ("listing levels"). The industry-wide chemical constituent concentration limits we are considering for use in a proposed rule would be risk-based, and thus protective of human health and the environment. These limits would also serve as pollution prevention incentives for the vehicle manufacturing industry, which, if met, would have the effect of removing or reducing certain hazardous constituents from these wastewater treatment sludges.

Purpose: We are presenting the F019 wastewater treatment sludge sampling data collected and analyzed by the Agency to date in considering a proposal to amend the F019 hazardous waste listing. The Agency is analyzing these data for the purpose of establishing concentration limits for key constituents of concern for wastewater treatment sludges generated by zinc phosphating processes at manufacturing and assembly plants in the automobile and light trucks manufacturing industry (NAICS codes 336111 and 336112, respectively).

Delisting and verification sampling data

As mentioned previously, six motor vehicle manufacturers have submitted prior plant-by-plant delisting petitions to EPA for their F019 waste. In the analysis EPA is conducting for this potential proposed rulemaking, EPA has used information from 13 motor vehicle manufacturing

[4] The six motor vehicle manufacturing companies which submitted facility-specific F019 delisting petitions between 1996 and 2004 were: General Motors Corporation, Bavarian Motor Works (BMW) Manufacturing Corporation, Nissan North America Incorporated, DaimlerChrysler Corporation, Ford Motor Corporation, and the Auto Alliance International Incorporated (Ford/Mazda joint venture).

facilities' petitions.[5] Of the 13 petitions submitted, 12 delisting determinations were made. The full set of delisting information used by EPA in the 12 F019 delisting determinations for motor vehicle manufacturing plants (1997-2004), are located in the EPA Regions 4 and 5 dockets, depending on petitioning facility location.[6] The remaining petition, General Motors Oklahoma City, Oklahoma, which was submitted in draft form was later withdrawn. An excerpt from this draft petition is included. See Support Materials.

The delisting petitions contain information on the chemical composition and constituent concentrations of the F019 waste at each facility. The facilities prepared sampling and analysis plans that described the manufacturing conditions and waste management practices, how the waste samples were taken, and the laboratory analytical procedures used to evaluate the presence and quantity of chemical constituents in the waste.

For some delistings granted by EPA, the facility generating that waste must periodically sample and analyze the waste for the presence and quantity of specific chemical constituents of concern (COCs). This periodic sampling and analysis is called "verification sampling." In some cases, facilities submit the results of this verification sampling and analysis to EPA to ensure that the waste's continuing status as nonhazardous is appropriate. We have compiled the verification sampling results from the motor vehicle assembly plants that were granted a F019 delisting as of spring 2004. The compiled delisting petition and verification sampling data are available. See Support Materials.

In support of their March 3, 2000 letter, the Aluminum Association and the Alliance of Automobile Manufacturers submitted analytical sampling data (collected between 1989 to 1998) to EPA for wastewater treatment sludges generated from the zinc phosphating chemical conversion coating processes at 39 automobile and light truck assembly plants. Only 16 of the

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[5] The 13 motor vehicle manufacturing facilities are BMWMC (BMW Manufacturing Corp.), located in Greer, South Carolina; Nissan, in Smyrna, Tennessee; General Motors (GM) in Lansing, Michigan; GM in Lake Orion, Michigan; GM in Oklahoma City, Oklahoma (draft petition submitted and is available below - see Selected Support Materials section); GM in Lordstown, Ohio; GM in Pontiac, Michigan; GM in Hamtramck, Michigan; GM in Flint, Michigan; GM Grand River in Lansing, Michigan; Ford in Wixom, Michigan; Ford in Wayne, Michigan; and DaimlerChrysler Jefferson North in Detroit, Michigan.

[6] The Federal Register (FR) citations for the 12 delisting determinations for F019 are: GM in Lake Orion, Michigan (62 FR 55344, October 24, 1997); GM in Lansing, Michigan (65 FR 31096, May 16, 2000); BMWMC in Greer, South Carolina (66 FR 21877, May 2, 2001); Nissan in Smyrna, Tennessee (67 FR 42187, June 21, 2002); GM in Pontiac, Michigan, GM in Hamtramck, Michigan, GM in Flint, Michigan, GM Grand River in Lansing, Michigan, Ford in Wixom, Michigan, Ford in Wayne, Michigan (68 FR 44652, July 30, 2003); DaimlerChrylser Jefferson North in Detroit, Michigan (69 FR 8828, February 26, 2004); and, GM in Lordstown, Ohio (69 FR 60557, October 12, 2004).

39 assembly plants used aluminum in their manufacturing process. However, the data set did not identify which of those16 plants used aluminum. As noted earlier, the letter, data, and accompanying information submitted by the Aluminum Association and the Alliance of Automobile Manufacturers are available. See Support Materials.

EPA's preliminary view is that to be of use in identifying constituents of potential concern in F019 sludges from zinc phosphating conversion coating involving automotive bodies containing aluminum, we would need documentation regarding whether conversion coating of aluminum occurred when the samples were taken. In addition, our current view is that we would need additional descriptive information about the sample selection and handling processes (such as sampling procedures and sample holding times before laboratory analysis occurred), and information on analytical procedures used (sample preparation, analytical method, instrument calibrations, blanks, matrix spike and duplicate samples) that would provide us with a better understanding and interpretation of the data , and could result in qualifiers for some or all of the data provided. In the absence of such additional information, EPA's current thinking is that the analytical data compiled from the prior delisting petitions, rather that the data supplied in support of the March 3, 2000 letter, provide a more reliable basis for evaluating potential constituents of concern for F019 wastes.

Delisting Risk Assessment Software Version 2 (DRAS)

Version 2 of the Delisting Risk Assessment Software (DRAS) is a personal computer program that we may use to develop a proposal to amend the F019 listing to estimate potential human health and environmental risks from disposing these industrial wastewater sludges in non-hazardous waste landfills. DRAS calculates potential releases of chemical constituents from a landfill, the fate and transport of released chemical constituents, and potential risk associated with exposure to released chemical constituents. The DRAS evaluates chemical releases of volatiles and particulates to air, runoff to streams, and infiltration into groundwater. Surface exposure pathways include: inhalation of contaminated air, and ingestion of contaminated soils, surface water and fish. Groundwater exposure pathways include ingestion, dermal absorption (during bathing) and inhalation (during showering) of contaminated groundwater. The chemical constituent concentrations in soil, air and water at the point of exposure are based on Agency fate and transport models. For human health risk estimates, DRAS uses Agency risk assessment algorithms to determine potential risks for adults and children.

DRAS, version 2, is available on the EPA Region 6 website at http://www.epa.gov/region6/6pd/rcra_c/pd-o/dras/dras.htm. The DRAS program was created using Microsoft® VisualBasic 6.0 software programming. DRAS requires approximately 40 MB hard drive space; 64 MB of RAM is recommended to run the program. The time required to download this software program will depend on the speed of the internet connection. Download time could run from an hour to less than a minute depending on the type of connection.

EPA staff became familiar with certain problems related to this version of the model after

beginning to use version 2 and comparing its results with the DRAS version 1 model. The document "User Alert for DRAS Version 2" outlines the software errors that EPA is aware of and has adjusted for it in its use of DRAS Version 2 in delisting projects currently underway. See Support Materials.

Adjusting for these known software errors, EPA is using version 2 of the DRAS model to screen the 57 chemical constituents reported to be observed in the F019 sludge samples in the delisting petition and verification sampling data. The specific model inputs[7] for those 57 chemical constituents EPA is using in the screening level risk assessment are available below. See Support Materials.

Waste Volume and Disposal Time Frame Assumptions

The delisting petitions for the assembly plants that were submitted as of 2003 contained annual waste volume generation estimates ranging from a low of 190 cubic yards to a high of 2500 cubic yards per year, using certain assumptions and information about specific gravities and solids content when cubic yardage information was not supplied. However, in three instances (representing 6 out of 11 facilities), assembly plants co-disposed or planned to co-dispose their F019 waste from different generator locations in the same non-hazardous waste landfill once delisted. For these six assembly plants, combined annual volumes disposed at a single landfill ranged from a low of 1300 cubic yards to a high of 3200 cubic yards per year. The assumptions and information EPA is using to represent the annual F019 waste quantities are available below. See Selected Support Materials section. In order to represent the spectrum of waste volumes that could be disposed of by the motor vehicle manufacturers, EPA has chosen three annual waste volumes (1500, 2000 and 3000 cubic yards) to assess in the screening risk methodology,

Besides waste volume, a user input to the DRAS version 2 model is the number of years the waste is disposed of in the landfill during the landfill's operating lifespan prior to landfill closure. EPA plans to use a 30-year disposal period in the screening risk analysis. For an explanation of the data and assumptions on which this disposal period is based, see "Calculation of Municipal Landfill Active Life" in the Support Materials.

Risk Management Criteria

For this evaluation of F019 wastewater treatment sludges from vehicle manufacturers, we are planning to use the following risk management criteria:

> - For human health cancer risk, an individual's lifetime risk of one in one hundred thousand (1×10^{-5} risk level) from exposure to a particular chemical constituent in the waste, above and beyond that individual's already-existing background risk (for example,

[7]Model inputs include chemical-specific attributes such as molecular weight, Henry's Law Constant and solubility, as well as point estimates of human and ecological toxicity.

exposures from other sources such as diet).

- For human non-cancer health effects, an individual's exposure to a chemical constituent released from the landfill that is not expected to cause deleterious health effects if the exposure continues over a lifetime (excluding exposures the individual receives from other sources such as diet).

- For ecological risk, the continuous exposure of a community of aquatic organisms to a chemical constituent released from the landfill and washed into a nearby surface water body, at concentrations that are not expected to cause unacceptable effects.[8]

Screening methodology

Using the observed values for the 57 chemical constituents detected in these sludges, the DRAS model inputs in the spreadsheets available in the docket, the three annual F019 sludge volumes indicated above, the 30-year landfill placement assumption, and the risk management criteria described above, we plan to generate allowable levels for landfill disposal using the DRAS version 2 software.[9] The allowable levels consist of concentrations in the sludge, that, under the assumptions used in the analysis, should not present a risk greater than the cancer and non-cancer risk thresholds used as the risk management criteria. There are uncertainties associated with these allowable levels that are difficult to quantify, in part because the estimates are based on numerous assumptions of future waste sludge patterns and conditions that may or may not occur in the future.

Two chemical constituents, fluoride and lead, are present in the F019 waste and cannot be assessed with the DRAS version 2 software. For fluoride, EPA is considering use of an assumed landfill dilution and attenuation factor (DAF)[10] of 10, the corresponding volume-adjusted DAFs of 29, 24 and 18 for the volumes 1500, 2000, and 3000 cubic yards, respectively,[11] and the current maximum contaminant level for fluoride in drinking water of 4 mg/liter in order to develop allowable levels for fluoride in the F019 waste. Note that this methodology would only

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[8]Expressed as freshwater Criteria Continuous Concentration, or CCC, in the National Recommended Water Quality Criteria, or corresponding state water quality criteria.

[9] We select trial waste concentrations to use as inputs and run the model repetitively in order to reach the desired risk management criteria for cancer and non-cancer health effects.

[10]This DAF is calculated by taking the ratio of the chemical constituent's concentration in the landfill's leachate to the concentration at a down-gradient drinking water well. See the document, "Application of EPACMTP to Region 6 Delisting Program: Development of Waste Volume-Adjusted Dilution-Attenuation Factors", which is available. See Support Materials.

[11]Based on equation 2-3 of "RCRA Delisting Technical Support Document," which is also available. See Support Materials.

account for fluoride exposure through drinking water that becomes contaminated by fluoride-containing leachate from the landfill. Due to lead's bioaccumulation in the human skeleton and the apparent lack of a threshold for human health effects, EPA does not have a non-cancer health effects level for lead in its Integrated Risk Information System (IRIS) database. Thus, currently it is not possible to develop allowable levels for lead in the waste using the same methodology as the other chemical constituents. Therefore, we are considering use of the current toxicity characteristic leachate level (5.0 milligrams lead per liter of leachate) as a proposed listing level for this waste.

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